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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Fur Seal Family

See Page 307

A SCIENCE SERVICE PUBLICATION

Kodak reports to laboratories on:

sponsored films for the kiddies . . . 59 years of radiographic tricks . . . how we became horticultural apothecaries

A gift horse's teeth

On the one hand, the educators, facing the oncoming hordes of kids by the unanticipated millions. With so pitifully few skillful and enthusiastic teachers to serve as infantry, reliance on the audio-visual artillery and cavalry must inevitably grow. Moreover, much of it is free, from public-spirited sources interested in the education of the young. Too bad that these gorgeously colored 16mm gift horses have to be looked so closely in the mouth to make sure they leave some more lasting kernel of truth than that Zilch's Flashlights pierce more gloom.

On the other hand, Zilch's advertising manager, no leering ogre but an intelligent, conscientious family man charged with much of the responsibility for keeping the people of the whole Zilchville Valley gainfully employed making dry cells. His is the task of explaining to young Zilch, the treasurer, how a film on basic principles of electrochemistry may possibly plant with the oncoming generation a seed of respect for the briefly seen Zilch trademark.

We're in the middle. We make projectors for the schools and film for Zilch's producer to use. We think both sides ought to be interested in the new booklet of the Association of National Advertisers, entitled "Criteria for Business-Sponsored Educational Films." (\$2, from A. N. A.'s headquarters, 285 Madison Avenue, New York 17, N. Y.)

The soft x-ray

Because so many professional opinions on periodontoses, pelves, porosities, and the like are reached from observations on our x-ray film, we find ourselves with the resources to do little things for our friends, who are legion.

For example, a bibliography on soft x-ray microscopy, microradiography, electron radiography, and geometric x-ray microscopy.* It lists every paper and article on those subjects known to us, some 350 in number. It is not annotated. The arrangement is alphabetical by au-

thors, whether they be of the industrial, medical, metallurgical, botanical, zoological, entomological, or fine arts persuasions or just plain physicists.

The earliest reference was published April 13, 1896, in *Comptes rendus hebdomadaires des séances de l'Académie des sciences* by F. Ranwez under the title, "Application de la photographie par les rayons Röntgen aux recherches analytiques des matières végétales." The most recent is dated August, 1955, and deals with electron radiography in the investigation of postage stamps. And, we have not neglected "Микрорентгенография" (С. В. Гречишкин, *Вестник рентгенологии и радиологии*, 20: 397-408, 1938).

Sending out free copies of the microradiography bibliography is easy for Eastman Kodak Company, X-ray Division, Rochester 4, N. Y. We'll go beyond that. If you'll give us the details of your problem, we'll do our best to answer questions about the use, handling, and behavior of sensitized materials in experimental radiographic work. But you wouldn't want us to do your research for you, would you?

*For the casual reader:

Soft x-rays are those of wavelength longer than about 0.25 Å. They are so easily absorbed that exceedingly thin or low-density materials, quite transparent to the ordinary x-rays of the healing arts, cast informative shadows. If the shadows are of microscopic details, if they are caught on very fine-grain film in close contact with the specimen, and if this film image is greatly enlarged in printing, that is microradiography. A switch in this technique is to use hard x-rays (wavelength shorter than 0.050 Å) that can knock electrons out of a sheet of lead and let differences in absorption of the electrons by the various parts of the specimen tell the story on film. This is electron radiography. Still another way of doing x-ray microscopy is to use a very tiny but intense x-ray source and keep it so close to the specimen that it casts greatly enlarged sharp x-ray shadows on the film, which can then be even further enlarged in projection printing. This is geometric x-ray microscopy.

Orchid medicine

Medicine for people we don't sell, nor medicine for animals. Medicine for orchids, yes—the two aromatic salts, *o*-Phenylphenol Sodium Salt (*Pract.*) (Eastman P2896) and 8-Quinolinol Sulfate (Eastman 1776). Only this past spring did we learn that we had it to sell. Letters began to drift in asking for descriptive literature on our orchid remedies. What could we answer? Of course we had no such literature, but could we deny that among our 3500-odd items there might be something to cure an ailing orchid?

(People are always assuming that because we sell a chemical we know all about its sundry uses and have hungry salesmen panting for an opening to demonstrate them all. This is a perfectly natural assumption that happens to be false with respect to Eastman Organic Chemicals. Unlike the entrepreneur who sells the sizzle instead of the steak, we sell the chemicals rather than the benefits they confer. But we do love to sell the chemicals.)

What we did was to track down the plant pathologist who had found these two particular compounds to be capable of making a fine distinction between the metabolic systems of orchids and those of certain bacteria and fungi that infest them. (Use in 1:2000 dilution by spray or immersion for 60 minutes or longer.) We checked with him on the identity of the compounds and then hung out our shingle as horticultural apothecaries with a limited line.

If any man thinks he can make a living by putting these compounds up under his own trademark and backing it with more helpful service to orchid growers than ours, more power to him and we hope he lets us quote on supplying the chemicals. They're among some 3500 available from Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y. (Division of Eastman Kodak Company).

This is one of a series of reports on the many products and services with which the Eastman Kodak Company and its divisions are . . . serving laboratories everywhere

Kodak
TRADE MARK

MEDICINE

Try Anti-Cold Vaccine

Fight against the common, misery-producing cold will include mass trial of a new vaccine for a special, infectious variety by Army volunteers.

A MASS TRIAL of a new vaccine against a special kind of infectious cold is expected to get under way within a year.

It will be something like the mass trials of the polio vaccine summer before last. But instead of grade school children, 5,000 to 10,000 military recruits will be lining up for shots.

Special groups of industrial workers are likely to get shots of another, similar vaccine if signs appear among them of an epidemic of eye disease, called "shipyard fever" in World War II.

These are the prospects for the near future in the fight against colds that make eyes red and running, throats sore, glands swollen, and sneezes and sniffles and general misery.

For the sneezing and runny nose kind of cold, scientists need more time to produce a preventive vaccine. But they have them for some "grippe-like" colds and believe they can make them for some others.

The plans and hopes for the future trial of one cold vaccine among military recruits were revealed by Drs. R. J. Huebner, J. A. Bell and Victor Haas of the National Institutes of Health, Bethesda, Md., and Dr. T. G. Ward of Johns Hopkins School of Hygiene and Public Health, Baltimore.

This group already has a large pool of vaccine produced for the purpose. Army authorities are enthusiastic, they said. Details of the trials will be worked out as soon as small-scale trials to determine safety and dosage are completed. Commercial houses, especially one that has produced polio vaccine, are working on this vaccine.

The vaccine is made from three formalin-killed viruses. They are types 3, 4 and 7 APC viruses. The letters APC stand for adenoid, pharynx (in the throat) and conjunctiva of the eyes. These are the regions from which the viruses have been isolated.

Types 3, 4 and 7 for which vaccine has now been made are the ones that cause a five or six day attack of feverish, grippe-like illness in a large proportion of military recruits. These also cause the grippe-like sickness that hits colleges and universities every year in mid-october.

A vaccine against just type 3 has already been tried in prisoner volunteers. It prevented the sickness in about 70% of the susceptible volunteers when the vaccine was "challenged" by doses of live virus swabbed on the eye.

Among susceptibles without the vaccine, this "challenge" produced sickness in 94% within two to six days. The vaccine is expected to give even greater protection against naturally caught disease, since a person is not likely to get such a big dose

of virus that way. The vaccine caused no reactions among the volunteers, not even a sore arm, although the volunteers would have been sure to report a sore arm in order "to get off working on the rock pile."

As evidence that the vaccine contains no live virus, the scientists reported that it contains at least ten times as much virus-killing formalin as "another well known vaccine," meaning the polio vaccine.

Type 3 APC vaccine takes effect within ten days to two weeks. It probably protects for more than one year, although the scientists do not yet know this for a fact. It is only six months since they first used it. The vaccinated, however, had protective antibodies in their blood for at least two months after. Patients who got the disease in 1951 still have, now in 1955, antibodies at a high enough level to be protective.

Details of the type 3 APC vaccine trial among prisoner volunteers are reported in the forthcoming *Journal of the American Medical Association* (Nov. 5).

Science News Letter, November 12, 1955

BIOLOGY

Fur Seals Make Annual Pilgrimage

See Front Cover

Each fall females and young fur seals take a sea voyage from the Pribilof Islands of the Bering Sea as far south as southern California.

The bulls stay farther north in winter to get choice spots at the breeding grounds the following spring. One large bull, shown facing the camera on the cover of this week's *SCIENCE NEWS LETTER*, keeps a wary eye over his family.

Science News Letter, November 12, 1955

MEDICINE

"Road Map" Helps X-ray Ulcer Treatment

► WITH THE AID of a "road map" drawn on the stomach of ulcer patients, University of Chicago scientists are helping prevent return of the ulcer trouble by X-ray treatment.

Results of the method, in use since 1937, were reported by Dr. James W. J. Carpenter at American Roentgen Ray Society meeting in Chicago.

The road map gives the outline of the patient's stomach as it is seen using a fluoroscope. The treatment is designed to reduce acid secretion and is not a cure.

Science News Letter, November 12, 1955



DEADLY TO MATE AND MAN—The love of scorpions like this one for dark, secluded spots is the reason campers in tropical and sub-tropical areas are wise to shake out their boots before they put them on in the morning. This specimen is probably *Centruroides sculpturatus*, a common and deadly species of Arizona. Like their distant relative, the black widow spider, female scorpions eat the males after mating.

DENTISTRY

Gums Cause Tooth Loss

► DISEASE of the gums is the greatest single cause of tooth loss, Comdr. Samstone Holmes of the U. S. Naval Dental School, Bethesda, Md., declared at the meeting of the American Dental Association in San Francisco.

Dentists call the condition periodontal disease. It involves the layer of tissue covering the root of the tooth and lining the wall of the tooth socket in the jaw bone.

Failure to use the toothbrush in the right way and at the right time is a principal factor in the breakdown of gum tissues, Comdr. Holmes said.

Bone destruction accompanying periodontal disease was found in 97% of persons between the ages of 41 and 45 in one study, he reported. In another, bone loss was found to exist in 85% of persons in a 36- to 45-year age group.

The Navy dentist deplored the night and morning toothbrushing habit, pointing out that food debris and tartar build up from the morning brushing progressively at each meal until bedtime.

Drug Soothes Child

► THE CHILD who is tense and frightened or rebellious and defiant when at the dentist's can be soothed and relaxed by a synthetic sedative drug, meperidine.

Good results in using it 200 times for 90 children between the ages of three and 12 were reported by Lt. Comdr. Earl L. Lamphire of Sunnyvale, Calif., at the meeting.

The drug was safe and effective in banishing nervous apprehension, Comdr. Lamphire found. He called it "quick, predictable and controllable."

It is useful also for the child who must remain in the dentist's chair for a long time.

It is given by injection in the arm or mouth tissues. The effect lasts for an average of one and one-half hours, during which the child is relaxed and cooperative.

Anchor False Teeth

► FOR SOME PERSONS who have trouble wearing false teeth, a way has been found to anchor the lower ones directly to the jawbone. The method was announced by Col. Roy L. Bodine Jr., chief of dental services at William Beaumont Army Hospital, El Paso, Tex., at the meeting of the American Dental Association, San Francisco.

The false teeth anchoring device has been used in 12 cases since 1950.

"A cautious approach is definitely indicated," Col. Bodine said, stressing the need for more work in this field of tooth replacement.

To anchor the false teeth, a metallic mesh framework is cast in the contour of the jawbone. This is firmly fixed to the jaw-

bone foundation by means of screws. The teeth are contained in a detachable superstructure fitted to implant abutments or posts protruding from the underlying framework.

Col. Bodine explained that the implant denture transfers the stresses of eating directly onto the jawbone surface and no pressure is felt on the gum tissues.

The appliance only lasts from one to four years.

Science News Letter, November 12, 1955

BIOLOGY

Ducks Return to Flyway When Carried Far Away

► TO MALLARD DUCKS, there's no place like home, banding experiments with the waterfowl indicate.

Two years ago, 448 mallards were trapped and banded in Missouri, part of the Mississippi flyway, and released in the Atlantic flyway in Maryland. Since then, 35 of the banded birds have been recovered—33 of them back on their old range in the Mississippi flyway.

Bands from the mallards were returned from Alberta and Saskatchewan and southward to Louisiana.

The experiment was repeated last year, with 908 birds being taken east and released, said Lewis Helm, biologist with the Missouri Conservation Commission. He urged duck hunters to keep on the lookout for bands among their bird kills to help in the study of migration habits.

Science News Letter, November 12, 1955

SURGERY

Clamp Lets Blood Flow While Surgeon Stitches

► A CLAMP that lets the blood go on flowing through a cut artery or vein while the surgeon stitches a graft into the artery or vein was announced at the meeting of the American College of Surgeons in Chicago.

Purpose of the new clamp is to avoid stopping blood flow for more than three minutes, although stitching a vein or artery graft to the walls of the blood vessel is delicate surgical needlework that takes a little time.

In effect, the new clamp prepares the cut blood vessel for the surgical stitching much as a woman pins two edges of material securely together before sewing a seam to join them.

The clamp has jaws of various sizes in the shape of a split ring. These are mounted in handles that can be joined, bringing the jaws together. The cut end of a blood vessel is brought through the hole of the ring. The edges are turned inside out and held that way with fine pins. The other cut end is prepared in the same way. Then the

handles are joined, bringing the cut ends together.

The blood, held back meanwhile by other clamps, can be allowed to flow through the cut ends again. The surgeon then puts his stitches on the edges of the blood vessel that have been turned inside out for the purpose. When he has finished sewing, the jaw-ring clamp is removed.

The clamp was devised by Drs. William D. Kelly and John F. Alden of the Veterans Administration Hospital and University of Minnesota Medical School, Minneapolis.

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GENERAL SCIENCE

Solar Water Pump

Device that works much like a steam engine, about one hundred years old in principle, demonstrated. Alternate vaporization and condensation of water provide pumping action.

► AN ENGINE powered by solar heat is now practical, the Conference on Solar Energy in Tucson, Ariz., was assured. It will be used for pumping water and should help make the dry and arid lands of the world more fruitful.

Demonstrated by Calvin D. McCracken of Jet-Heat, Inc., Englewood, N.J., the new Thermopump pumps water by a device that is much like a steam engine, but without piston or crankshaft. The principle is about a hundred years old, but has been applied only in the last two years.

Alternate vaporization and condensation of water between two check valves provide the pumping action, which recycles automatically. An air cushion is used to give an even flow. Heat storage will be designed and installed to continue the water flow during cloudy days and at night.

A working model of small size, powered by the rays of an electric lamp representing the sun, was demonstrated at the meeting. Mr. McCracken said flows of several hundred gallons per minute and heads of 1,000 feet are within the pump's reach.

Another new sort of solar engine was described by Italian engineer, Prof. Luigi d'Amelio of the University of Naples. The system, which involves mixing of vapors of liquids that do not themselves mix, permits vaporization of the liquid within the tepid, sun-heated water. This does not require heat transmission through the walls of the evaporating vessel, thus increasing output and improving economy.

Conversion of sunlight directly into electricity by the newly developed silicon solar batteries will compete with commercial and dry batteries in the near future, William R. Cherry of the Signal Corps Engineering Laboratory, Fort Monmouth, N.J. reported.

Made of semiconductors the solar batteries are expected to be portable and long-lived electrical power sources.

Dr. Richard N. Thomas of Harvard College Observatory, Cambridge, Mass., discussed three different ways of classifying the total electromagnetic radiation from the sun.

He showed that each of three classifications—by wavelength, source in the sun's atmosphere or the amount of variability—leads to the same division of the sun's radiation.

Methods of measuring available solar energy were discussed by Dr. Sigmund Fritz of the U.S. Weather Bureau. He recommended a procedure long advocated by optimistic poets: count the percentage of sunshine in your days, instead of counting the clouds. Ozone absorbs an appreciable

quantity of light, Dr. Fritz said. Most measurements of solar energy are made on flat ground and the effect of mountainous terrain on the observed values is not well known.

The sunny world has a new "roof," the covering of usable energy the sun lays down on the earth's surface on an average clear day.

"Roof" is the new unit, described as the quantity of sunlight energy that would fall on the actual roof area of a small house, about 33-feet square, during a day when the sun shines at the rate of a million calories per minute. Dr. Farrington Daniels, University of Wisconsin chemist, proposed this unit to measure useful sunshine.

With eight hours of sunshine, a "roof-day" of solar energy would provide as much heat as would the burning of a man's weight of coal or of the gasoline in the fuel tank of a small automobile.

Use of this quantity of sunshine to furnish the small-scale power needs of the world, for heating houses, for pumping water, for preparing food, is the goal of scientists and engineers attending the symposium, sponsored by the Association for Applied Solar Energy.

"Unlike atomic energy," Dr. Daniels said, "solar energy has no critical mass, no health hazards (except sunburn), and no waste products to dispose of. Anyone can go out in his yard and run a toy steam engine with free sunshine."

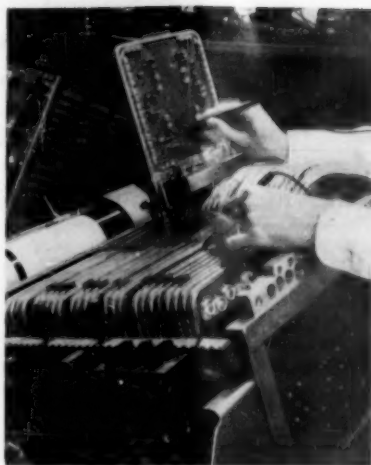
Using Sun's Heat

► ARCHITECTS of the future will think less in terms of insulation to keep out the sun's heat and more in terms of using the roof as part of the heating system of the house as a result of the suggestions made by experts attending the World Symposium on Applied Solar Energy in Phoenix.

Cities located as far north as Phoenix, Rome and Tokyo and as far south as Rio de Janeiro and Sydney should seriously consider sunlight as competitive with firewood, kerosene, bottled gas and electricity for heating and cooking, Dr. J. E. Hobson, director of Stanford Research Institute, told the meeting.

Power generators on artificial satellites could be run by solar energy, Drs. Richard C. Jordan and Warren E. Ibele of the University of Minnesota suggested, noting the usefulness of small power systems run at low temperatures for use in remote areas where few clouds get in the way.

Such solar power installations contrast with atomic power plants being developed



AIRBORNE COMPUTER — Circuits are checked in the new airborne digital computer in which transistors have replaced vacuum tubes. They were designed by North American Aviation as standardized panels.

as large central power systems in thickly settled areas.

Solar furnaces, reaching temperatures of 3,000 degrees centigrade, focus the sun's heat by one or more mirrors. Such heating is preferred for research because it avoids contamination by fuel or crucible material.

A mass of powdered metal melts only in the center, thus it becomes its own crucible, Dr. Felix Trombe, director of the French Solar Energy Laboratory explained.

The sun's heat melts metals but will not bake bread.

The sun's energy is free but too expensive to use.

Sunlight can be used to generate electricity but the sunpowered storage battery is yet to be invented.

Scientists have by long and diligent work puzzled out all but the earliest, most essential step in photosynthesis, but the lowliest one-celled bit of green scum in a roadside ditch has known it all the time.

Mankind can solve the problem of feeding the world's fast-growing population by eating these one-celled green ditch-water plants, but beefsteak tastes better.

Such are the dilemmas of solar energy, tackled from the standpoint of practical application at the symposium.

Burning-glass lenses, paraboloid mirrors and improved cold frames concentrate sunlight, electronic guiding mechanisms hold the sun's image steady while the earth turns, architects redesign roofs to catch both summer and winter sunlight, refrigeration engineers plan heat sinks to cool buildings in summer, warm them in winter by sunshine and store excess for use on rainy days.

Successful application of these principles were viewed in Phoenix by scientists who had shared theories and experience on solar energy use at the Tucson meeting.

Science News Letter, November 12, 1955

BIOCHEMISTRY

Polio Virus Crystallized

Scientists report the first crystallization of a virus, that of polio, infectious to men or animals. About half a dozen plant viruses have been crystallized since 1935.

► THE FIRST CRYSTALLIZATION of a virus, that of polio, that is infectious to men or animals has been achieved by the University of California scientists.

The accomplishment removes a little more of the mystery of viruses in general and polio viruses in particular. It assures the scientists they are working with highly purified polio viruses, and thus establishes precise standards of accuracy in research with the agents.

Drs. C. E. Schwerdt and F. L. Schaffer, both of the Virus Laboratory at Berkeley, reported their findings at the National Academy of Sciences meeting at the California Institute of Technology in Pasadena. The work was supported by the National Foundation for Infantile Paralysis.

About half a dozen plant viruses have been crystallized since the feat was first accomplished in 1935 by Dr. Wendell Stanley, who won the Nobel Prize for it and now directs the Berkeley Virus Laboratory.

The delay in crystallization of human or

animal viruses comes from the difficulty of obtaining these agents in pure enough form. The polio strain crystallized was MEF-1, Type II, grown in monkey kidney tissue fluid.

The polio crystals are readily photographed. They have a rectangular box shape, with a triangular pyramid on each end. A single crystal measures about a thousandth of an inch long and contains nearly a billion virus particles.

When held to the light, a small vial of the crystals glistens like finely crushed diamonds.

Only a tiny quantity of the material was obtained, about one-thousandth of a gram, from four gallons of starting material. It would take about a million gallons of the tissue to produce a pound of virus crystals, at a cost of about \$500,000,000. This quantity could produce over a billion does of vaccine.

The crystals will help the Berkeley scientists in further studies of the chemical and physical nature of polio viruses.

Science News Letter, November 12, 1955



DR. VINCENT DU VIGNEAUD
—The winner of the 1955 Nobel Prize in chemistry, Dr. Vincent Du Vigneaud of Cornell University Medical College, New York, is shown receiving congratulatory calls in his office. Discovery of a way to make synthetic hormones won him the award.

CHEMISTRY

Nobel Prize Research on Chemical Control of Body

► DISCOVERY of a process for duplicating in the laboratory fundamental chemicals controlling human body functions has won the 1955 Nobel Prize in chemistry for Prof. Vincent du Vigneaud of Cornell University Medical College, New York.

The chemicals Prof. du Vigneaud has already synthesized are two hormones produced in the body by the pituitary gland. This nut-sized structure at the base of the brain has been called the body's master gland.

It is perhaps best known to the layman as the source of ACTH, famous for its anti-arthritis action.

Oxytocin was the first pituitary hormone synthesized by Prof. du Vigneaud, and the first hormone of this gland ever synthesized. It gets its name from the Greek word for "rapid birth."

Its action in the body is two-fold:

1. It causes the uterus to contract in childbirth.

2. It influences release of milk from the mammary glands of the mother.

Second pituitary hormone Prof. du Vigneaud synthesized is vasopressin. This blood pressure-raising, antidiuretic hormone is of prime importance in the treatment of diabetes insipidus and the diagnosis of epilepsy.

The basic chemical work that led to discovery of the structure of these hormones and then to their synthesis was begun in 1932 while Prof. du Vigneaud was on the

GEOPHYSICS

Geophysical Year Plans

► "STARTLING DISCOVERIES" will result from research during the International Geophysical Year, Dr. Joseph Kaplan, University of California physicist heading the United States Committee charting this country's part in the project, predicted.

"Never in history has such a world-wide study been undertaken by man," Dr. Kaplan, Wilson College, Chambersburg, Pa., convocation speaker, said. He outlined plans for U. S. participation in the I.G.Y., which runs for 18 months starting July 1, 1957. (See SNL, Jan. 15, 1955, p. 42.)

Congress has so far appropriated \$12,000,000 for this vast effort in which more than 40 nations will cooperate to learn more about man's physical environment. Included in the U. S. I.G.Y. program is the launching of artificial earth satellites to probe the outer atmosphere at distances of between 200 and 800 miles above the earth.

"A single successful flight of the satellite" will provide more observing time in the high atmosphere than that resulting from all the ordinary rockets yet fired. That, Dr. Kaplan explained, is why this program has been called the LPR—long-playing rocket.

Three special lines of stations will stretch from pole to pole at 10 degrees east, at 140

degrees east and at 70 to 80 degrees west, Dr. Kaplan said.

Measurements to be made at these and other stations, and at especially established bases in the Arctic and Antarctic, will be in the following fields: aurora and airglow, cosmic rays, geomagnetism, glaciology, ionospheric physics, longitude and latitude determinations, oceanography, seismology and gravity, and solar activity.

Upper atmosphere rocket and satellite studies will also be made.

"These fields are characterized by their global nature," Dr. Kaplan explained. Events occurring on one side of the earth have important effects on what happens on the opposite side.

"The laboratory of the geophysicists is the earth itself," Dr. Kaplan said, "and the experiments are performed by nature." Such world-wide phenomena can be understood and explained only through cooperative and coordinated research as planned for the International Geophysical Year, Dr. Kaplan concluded.

Science News Letter, November 12, 1955

Rockets are being used to measure cosmic ray intensity at high altitudes near the geomagnetic pole.

faculty of George Washington University in the nation's capital, and continued there for six years before he went to Cornell.

During World War II this work, then under way at Cornell, was interrupted while Prof. du Vigneaud worked on the chemical mystery of the then scarce and vital penicillin. Late in 1946, after 38 groups of scientists had been working on the problem for years, Prof. du Vigneaud succeeded in synthesizing the famous mold chemical.

When told by SCIENCE SERVICE of the Nobel Prize award for the pituitary hormone research, Prof. du Vigneaud was quick to point out that "many, many people" had participated with him through the years in the researches for which the award was made.

Science News Letter, November 12, 1955

PHYSICS

Physics Nobel Winners Changed Theory of Light

► A COMPLETE RESTATEMENT of the theory of light resulted from the studies of the two United States physicists who won this year's Nobel Prize in physics.

Dr. Willis E. Lamb Jr., now a professor at Stanford University, Calif., and Dr. P. Kusch of Columbia University share the top scientific honor for studies of atomic structure performed at Columbia under Prof. I. I. Rabi, also a Nobel Prize winner.

Although the experiments by the two scientists were entirely separate, the results of both demonstrated that previous theories of atomic behavior needed revision.

Dr. Kusch measured very accurately the magnetic moment, or strength, of spinning electrons for many elements, using the molecular beam method. His careful and painstaking work proved that an electron's magnetic strength was one-eighth of one percent larger than had previously been thought.

Small as this discrepancy might seem, it was actually very big to physicists. When combined with results of Dr. Lamb's studies concerning the energy levels of the hydrogen atom, scientists were forced to find an explanation for the discrepancies between theory and observation.

The new Nobel Prize winners' work "gave real impetus" for changes in the theory, put forward by another Nobel Prize winner, Prof. P. A. M. Dirac, Dr. Rabi told SCIENCE SERVICE.

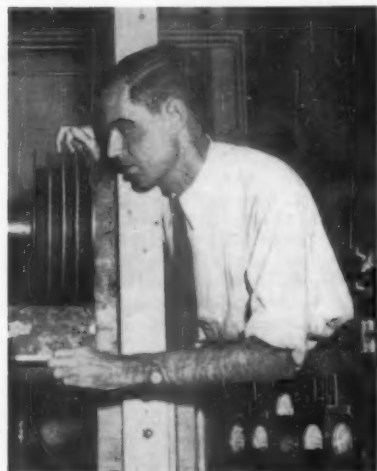
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Science News Letter, November 12, 1955



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PSYCHOLOGY

Mind Has 40 Dimensions; More to be Discovered

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This is shown, Dr. J. P. Guilford, of the University of Southern California said, by a statistical study of the relation among scores from tests involving different intellectual tasks.

The intellectual factors or dimensions of the mind have a tendency to fall into a system, including a small group of memory factors and four groups of thinking factors, Dr. Guilford reported.

The thinking ability factors include discovery abilities, action abilities and evaluation abilities. The action abilities can be further divided into convergent thinking and divergent thinking.

When all the intellectual factors are mapped out in a table comparable to the chemist's periodic table of elements, there are vacant cells in the table showing that mental factors exist that have not yet been identified, just as the periodic table of elements once contained empty cells representing elements then undiscovered.

When the empty cells of the chart of intellectual factors are all filled up, the total number of factors will approach 60, Dr. Guilford predicted.

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SURGERY

Link Brain Blood Supply for Heart Operations

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With this new technique, blood supply to all but the brain will be cut off in the patient undergoing a heart operation, and the brain linkage will keep the brain supplied with oxygen. Oxygen lack destroys brain tissue faster than any other tissue in the body.

So far the method has been tried only on laboratory animals. Half of those operated on survived 24 hours or longer, with 16 of the total of 44 remaining in good health.

The brain-linking operation was devised by Drs. William H. Peniston and Victor Richards of Stanford University Hospital, San Francisco, who reported on it at the meeting of the American College of Surgeons in Chicago.

The operation was done by joining the carotid arteries and jugular veins of the two animals. Blood supply to the rest of one animal's body was then cut off, but the blood flowing to the brain kept this critical region supplied with oxygen while the surgeons operated on the "dry, open heart."

Science News Letter, November 12, 1955

BIOCHEMISTRY

Polio Virus Crystallized

Scientists report the first crystallization of a virus, that of polio, infectious to men or animals. About half a dozen plant viruses have been crystallized since 1935.

► THE FIRST CRYSTALLIZATION of a virus, that of polio, that is infectious to men or animals has been achieved by the University of California scientists.

The accomplishment removes a little more of the mystery of viruses in general and polio viruses in particular. It assures the scientists they are working with highly purified polio viruses, and thus establishes precise standards of accuracy in research with the agents.

Drs. C. E. Schwerdt and F. L. Schaffer, both of the Virus Laboratory at Berkeley, reported their findings at the National Academy of Sciences meeting at the California Institute of Technology in Pasadena. The work was supported by the National Foundation for Infantile Paralysis.

About half a dozen plant viruses have been crystallized since the feat was first accomplished in 1935 by Dr. Wendell Stanley, who won the Nobel Prize for it and now directs the Berkeley Virus Laboratory.

The delay in crystallization of human or

animal viruses comes from the difficulty of obtaining these agents in pure enough form. The polio strain crystallized was MEF-1, Type II, grown in monkey kidney tissue fluid.

The polio crystals are readily photographed. They have a rectangular box shape, with a triangular pyramid on each end. A single crystal measures about a thousandth of an inch long and contains nearly a billion virus particles.

When held to the light, a small vial of the crystals glistens like finely crushed diamonds.

Only a tiny quantity of the material was obtained, about one-thousandth of a gram, from four gallons of starting material. It would take about a million gallons of the tissue to produce a pound of virus crystals, at a cost of about \$500,000,000. This quantity could produce over a billion does of vaccine.

The crystals will help the Berkeley scientists in further studies of the chemical and physical nature of polio viruses.

Science News Letter, November 12, 1955



DR. VINCENT DU VIGNEAUD
—The winner of the 1955 Nobel Prize in chemistry, Dr. Vincent Du Vigneaud of Cornell University Medical College, New York, is shown receiving congratulatory calls in his office. Discovery of a way to make synthetic hormones won him the award.

CHEMISTRY

Nobel Prize Research on Chemical Control of Body

► DISCOVERY of a process for duplicating in the laboratory fundamental chemicals controlling human body functions has won the 1955 Nobel Prize in chemistry for Prof. Vincent du Vigneaud of Cornell University Medical College, New York.

The chemicals Prof. du Vigneaud has already synthesized are two hormones produced in the body by the pituitary gland. This nut-sized structure at the base of the brain has been called the body's master gland.

It is perhaps best known to the layman as the source of ACTH, famous for its anti-arthritis action.

Oxytocin was the first pituitary hormone synthesized by Prof. du Vigneaud, and the first hormone of this gland ever synthesized. It gets its name from the Greek word for "rapid birth."

Its action in the body is two-fold:

1. It causes the uterus to contract in childbirth.

2. It influences release of milk from the mammary glands of the mother.

Second pituitary hormone Prof. du Vigneaud synthesized is vasopressin. This blood pressure-raising, antidiuretic hormone is of prime importance in the treatment of diabetes insipidus and the diagnosis of epilepsy.

The basic chemical work that led to discovery of the structure of these hormones and then to their synthesis was begun in 1932 while Prof. du Vigneaud was on the

GEOPHYSICS

Geophysical Year Plans

► "STARTLING DISCOVERIES" will result from research during the International Geophysical Year, Dr. Joseph Kaplan, University of California physicist heading the United States Committee charting this country's part in the project, predicted.

"Never in history has such a world-wide study been undertaken by man," Dr. Kaplan, Wilson College, Chambersburg, Pa., convocation speaker, said. He outlined plans for U. S. participation in the I.G.Y., which runs for 18 months starting July 1, 1957. (See SNL, Jan. 15, 1955, p. 42.)

Congress has so far appropriated \$12,000,000 for this vast effort in which more than 40 nations will cooperate to learn more about man's physical environment. Included in the U. S. I.G.Y. program is the launching of artificial earth satellites to probe the outer atmosphere at distances of between 200 and 800 miles above the earth.

"A single successful flight of the satellite" will provide more observing time in the high atmosphere than that resulting from all the ordinary rockets yet fired. That, Dr. Kaplan explained, is why this program has been called the LPR—long-program rocket.

Three special lines of stations will stretch from pole to pole at 10 degrees east, at 140

degrees east and at 70 to 80 degrees west, Dr. Kaplan said.

Measurements to be made at these and other stations, and at especially established bases in the Arctic and Antarctic, will be in the following fields: aurora and airglow, cosmic rays, geomagnetism, glaciology, ionospheric physics, longitude and latitude determinations, oceanography, seismology and gravity, and solar activity.

Upper atmosphere rocket and satellite studies will also be made.

"These fields are characterized by their global nature," Dr. Kaplan explained. Events occurring on one side of the earth have important effects on what happens on the opposite side.

"The laboratory of the geophysicists is the earth itself," Dr. Kaplan said, "and the experiments are performed by nature." Such world-wide phenomena can be understood and explained only through cooperative and coordinated research as planned for the International Geophysical Year, Dr. Kaplan concluded.

Science News Letter, November 12, 1955

Rockets are being used to measure cosmic ray intensity at high altitudes near the geomagnetic pole.

faculty of George Washington University in the nation's capital, and continued there for six years before he went to Cornell.

During World War II this work, then under way at Cornell, was interrupted while Prof. du Vigneaud worked on the chemical mystery of the then scarce and vital penicillin. Late in 1946, after 38 groups of scientists had been working on the problem for years, Prof. du Vigneaud succeeded in synthesizing the famous mold chemical.

When told by SCIENCE SERVICE of the Nobel Prize award for the pituitary hormone research, Prof. du Vigneaud was quick to point out that "many, many people" had participated with him through the years in the researches for which the award was made.

Science News Letter, November 12, 1955

PHYSICS

Physics Nobel Winners Changed Theory of Light

► A COMPLETE RESTATEMENT of the theory of light resulted from the studies of the two United States physicists who won this year's Nobel Prize in physics.

Dr. Willis E. Lamb Jr., now a professor at Stanford University, Calif., and Dr. P. Kusch of Columbia University share the top scientific honor for studies of atomic structure performed at Columbia under Prof. I. I. Rabi, also a Nobel Prize winner.

Although the experiments by the two scientists were entirely separate, the results of both demonstrated that previous theories of atomic behavior needed revision.

Dr. Kusch measured very accurately the magnetic moment, or strength, of spinning electrons for many elements, using the molecular beam method. His careful and painstaking work proved that an electron's magnetic strength was one-eighth of one percent larger than had previously been thought.

Small as this discrepancy might seem, it was actually very big to physicists. When combined with results of Dr. Lamb's studies concerning the energy levels of the hydrogen atom, scientists were forced to find an explanation for the discrepancies between theory and observation.

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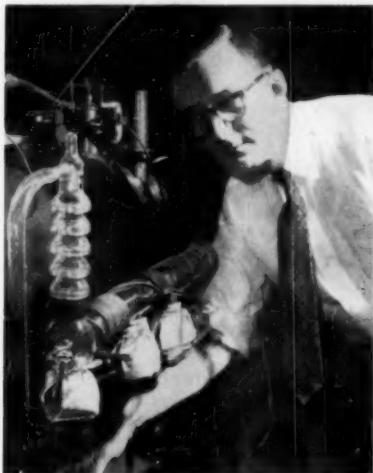
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ASTRONOMY

Stars Being Born Feed On Old Star's Material

► STARS BEING BORN feed on material spewed forth by old stars, two astronomers reported to the National Academy of Sciences meeting in Pasadena, Calif.

Such a feeding cycle accounts for observed differences in abundances of the elements between young and ancient stars, they suggested.

The earth and the sun are in a relatively late state of element evolution, Dr. Jesse L. Greenstein of Mt. Wilson and Palomar Observatories said.

That stars are continuously being formed out of interstellar gas is now a well-accepted theory by many astronomers.

"Recent observations," Dr. Greenstein pointed out, "have shown that various types of old stars are losing matter into space."

This lost material, he believes, eventually is used to form new stars. Meanwhile nuclear reactions in the old stars produce slightly different abundances than were present before matter was thrown off.

Studies of the synthesis and evolution of elements in stars were also reported to the meeting by Dr. William A. Fowler of the California Institute of Technology.

The results, he said, support the theory that this process of continuous synthesis as stars evolve, ejecting material into interstellar space, that is later recondensed, may be the source of the observed universal abundances of the elements.

Helium is formed by hydrogen burning in the majority of stars. When the helium is exhausted, still heavier elements react, leading to formation of the metallic elements.

Dr. Fowler's study was made in collaboration with Drs. G. R. and E. M. Burbidge, following work by Drs. E. E. Salpeter of Cornell University, Fred Hoyle of Cambridge University, England, and A. G. W. Cameron, Atomic Energy of Canada, Ltd.

Science News Letter, November 12, 1955

GENERAL SCIENCE

Urge More Science Activities for Youth

► THE EXTENSION of science fairs, in which thousands of young people in the United States show projects and exhibits to other countries throughout the world was recommended by the conference on the public understanding of science held by UNESCO, the United Nations' Educational, Scientific and Cultural Organization, in Madrid.

The meeting of more than a score of delegates, largely from European countries, formally recommended that other nations adopt the techniques developed in the United States for stimulation of interest in science by youth.

The meeting received a report on the

operation of 15,000 units of Science Clubs of America and of about a hundred science fairs culminating in the National Science Fair each year.

The need for training scientists is growing rapidly in every country, the conference found. As a means of recruiting more scientists for the future, it suggested that the rising generation should acquire a full appreciation of the service and adventure to be found in a career of science.

Parents should be given an opportunity to understand the underlying ideas and facts of science so they will approve of their children entering science.

Legislators and business executives should be given special opportunities, the experts advised, to understand the implications of science in the control of human destiny.

Professional writers, preferably trained in science, should be on the staff of newspapers, magazines, radio and television stations, the meeting urged.

Exhibitions, like those organized by UNESCO, were approved for use, particularly in countries with meager scientific resources.

Opening industrial, university and governmental scientific laboratories to visitors, particularly from schools, was found to yield effective results.

Science News Letter, November 12, 1955

MEDICINE

Drug Changes Mental Hospital Atmosphere

► A DRUG that improved the behavior of all but 50 of 500 mentally sick men and women has brought new problems to the staff of the mental hospital, Dr. Benjamin Pollack, assistant director of Rochester (N. Y.) State Hospital, reported to the American Psychiatric Association's Seventh Mental Hospital Institute in Washington.

The drug is chlorpromazine. It is "no cure-all," Dr. Pollack warned. But it helps by making the patients more receptive to treatment, more cooperative and willing to get along with others, less sensitive and consequently less irritable.

Of 500 patients given this drug at the Rochester institution, 14% were classed as "recovered" on the behavior improvement scale, and six percent had recovered from their mental sickness.

Because patients are no longer destructive, the formerly rather barren and sparsely furnished wards and recreation rooms now can have more chairs, sofas, television sets, drapes, pictures and other useful or decorative furnishings.

Attendants are stimulated because the patients can "talk and react as individuals." This means, Dr. Pollack pointed out, that the attendants must be given more training so they can work as part of the treatment team with doctors and nurses.

"When patients are more receptive and cooperative, they are also more demanding of other activities to occupy their waking hours," Dr. Pollack reported.

Science News Letter, November 12, 1955

IN SCIENCE

PSYCHOLOGY

I.Q. Raised as Drug Quiets Retarded Child

► A RISE in I.Q. of 10.4 points on the average followed treatment of 10 mentally retarded children with one of the new tranquilizing drugs, Dr. Howard V. Bair and William Herold, psychologist, of Parsons (Kans.) State Training School report in the *Archives of Neurology and Psychiatry* (Oct.).

The drug is chlorpromazine, trade named Thorazine.

The scientists attribute the rise in I.Q. to the "removal of severe emotional and nervous disorders which had prevented the students from functioning at their true level of mental ability."

A control group selected to match the Thorazine-treated students with regard to age, sex, and I.Q., was also studied. The I.Q. range in this group was 26 to 88, as compared with 30 to 108 for the experimental group. Upon retesting at the end of the 60-day period, an average I.Q. increase of 2.5 points per student was noted, as compared with the 10.4 points increase in the experimental group.

Science News Letter, November 12, 1955

SURGERY

Grafted Kidney Functions Well

► CONTINUED good functioning for more than nine months of a kidney transplanted from one human to another was reported by Drs. Joseph E. Murray, John P. Merrill and J. Hartwell Harrison of Peter Bent Brigham Hospital and Harvard Medical School, Boston, at the meeting of the American College of Surgeons in Chicago.

The kidney was transplanted from the body of one identical twin to that of his brother who was suffering from hopeless malignant high blood pressure with both kidneys diseased. The twin brothers were 24 years old at the time of the five and a half hour operation last Dec. 23.

The patient is free of symptoms and carrying on unlimited activity with no apparent disability. His appetite is good and he has gained 25 pounds.

Successful permanent transplant of a kidney from one human to another never has been accomplished. While such transplants function for a time, they are eventually cast off as a foreign body. The longest survival reported has been five and one-half months.

The transplant involving the twins appears to be a success, however, because of immunologic and genetic similarity of tissues.

Science News Letter, November 12, 1955

THE FIELDS

GENERAL SCIENCE

Free Discussion of Radiation Hazards

► FREE AND OPEN discussion of all possible atomic radiation dangers is "tremendously important at this time," the president of the American Association for the Advancement of Science, Dr. George W. Beadle, geneticist of the California Institute of Technology, declares in *Science* (Oct. 28).

Taking the Atomic Energy Commission to task for barring Prof. H. J. Muller's paper from the Geneva atomic conference, Dr. Beadle said:

"Many persons will regret the affair, because devious methods appear to have been used to keep Muller off the program and because his viewpoint, which happens to differ significantly from that of the Commission, was apparently not as fully represented at the conference as most geneticists would have wished."

Much remains to be learned about the amount of atomic high-energy radiation that harmfully affects man in low dosages, Dr. Beadle said, although geneticists agree there are effects.

"We cannot know too soon what are reasonable upper limits of radiation where large numbers of persons are involved," Dr. Beadle stated. "Important precedents are now being established, and it will be increasingly costly and difficult to modify them if they should prove inadequate."

There are compelling practical reasons in the peacetime atomic program for resisting any authoritarian or arbitrary suppression of the free and open discussion of the radiation hazards to man, Dr. Beadle warned.

Science News Letter, November 12, 1955

MEDICINE

Two-Drug Combine Seen Promising for TB

► A PROMISING new weapon against tuberculosis has apparently been forged from two older remedies.

Favorable results with it in a small pilot trial on patients with chronic, advanced tuberculosis are reported by Dr. J. W. Clegg of the Brompton Hospital, London, in the *British Medical Journal* (Oct. 22).

The drug is known so far by its laboratory code name, GEWO 339. Dr. Clegg calls it Sa for short. The letters, Sa, stand for salt. He uses them because the drug is the P.A.S. (para-aminosalicylic acid) salt of isoniazid.

Laboratory studies elsewhere had previously shown that this additive compound, Sa, could stop TB germs in the test tube

and was effective against strains resistant to isoniazid or P.A.S., either alone or in combination.

Dr. Clegg's pilot trial showed that the drug is effective in patients as well as in the test tube and that resistance to it did not develop quickly.

The patients liked it because it could be taken easily in tablets by mouth and did not cause the nausea that large doses of P.A.S. did.

The "most striking change" following Sa treatment, Dr. Clegg reports, was the "remarkable" lowering of positive sputums in patients suffering from chronic tuberculosis in both lungs with cavities. In six cases sputums became negative, that is, showed no TB germs, although these patients had never before had negative sputums. Three of the six had had other anti-TB medicines for some four years before Sa treatment.

A larger full scale trial of the new drug will be organized, Dr. Clegg hopes. He also hopes that others will make large scale trials of the drug.

Science News Letter, November 12, 1955

NUTRITION

Probe B Vitamin Role In Nervous System

► VITAMIN B-6, known also as pyridoxine, might almost be called the mystery vitamin, it appears from studies reported at a National Vitamin Foundation symposium at Vanderbilt University School of Medicine in Nashville.

This vitamin seems to play a definite part in the chemistry of brain and central nervous system activity. But its exact role has yet to be worked out.

Convulsions and other signs of nervous system irritability have been reported in babies and children who were not getting enough of the vitamin.

Brain wave changes appear when there is a gross lack of the vitamin. These changes can be swiftly corrected, with corresponding improvement in the patient's condition, Dr. David Baird Coursin of St. Joseph's Hospital, Lancaster, Pa., reported.

One two-year-old girl who had been operated on for hydrocephalus, or water on the brain, responded within a few minutes to injections of the vitamin. She had been unconscious and did not react to pain, light or sound. Her brain wave tracings were abnormal.

The brain wave records returned to normal and the baby became wakeful and noticed light and pain within 60 seconds after one vitamin B-6 injection. Then she lapsed back into her former state of stupor. She was again revived by the vitamin and for several days while getting the vitamin treatment she alternated between periods of wakefulness and unconsciousness. But finally the vitamin had no further effect and the baby got steadily worse.

Dr. Coursin reported her case for its example of brain wave changes in response to vitamin B-6.

Science News Letter, November 12, 1955

MANPOWER

Manpower Shortage Breaks Racial Bars

► WASTE OF SCIENTIFIC brains through racial discrimination in industry is being reduced by the fast-mounting shortage of scientists and technologists, a spokesman for the President's Committee on Government Contracts has reported.

Where once scientific and technical jobs in industry were all but closed to Negroes and other minorities, today these groups are not supplying enough trained people to fill jobs open to them.

Howard University, largest Negro university in the United States, regularly has more calls from industry for engineering graduates than it has been able to supply.

Any competent Negro engineer, physicist or chemist should be able to find a good position using his skills, as long as he is prepared to move to areas where jobs are available, the committee spokesman said. The scientists must move to be where industry needs them, not to find areas where discrimination is less severe.

This greater use of minority peoples in high-level scientific roles should stimulate their young people to study the sciences at the university level. Up to now, the great majority of Negro professionals have gone, almost without choice, into the ministry, law, medicine and teaching.

The President's Committee guards against discrimination by industries with Government contracts.

Science News Letter, November 12, 1955

NUTRITION

Antibiotic Dip Makes Salad Greens Keep

► MIXED SALAD GREENS will stay fresh twice as long in grocery stores and markets if they are dipped in a solution of either streptomycin or another antibiotic, Terramycin, before prepackaging, two scientists from Chas. Pfizer and Co., Inc., Brooklyn, N. Y., pharmaceutical manufacturers, reported at the meeting of the International Association of Milk and Food Sanitarians in Augusta, Ga.

The scientists are C. L. Wrenshall and J. R. McMahon.

Minute traces of a broad-range antibiotic such as Terramycin will lengthen the life of pasteurized milk from two days to several weeks, they reported. Ten parts of the antibiotic per million parts of slush-ice can lengthen the storage life of poultry from one week to two, and will also retard spoilage in fish, thus extending possible fishing periods by several days.

While the Food and Drug Administration has not yet approved the direct addition of antibiotics to foods the two scientists believe that "the attitude of regulatory officials is not inflexible in this regard. It seems possible," they stated, "that the stand may be modified as additional information becomes available."

Science News Letter, November 12, 1955

TECHNOLOGY

New Look for King Cotton

Chemists are changing the nature and properties of one of man's oldest textile fibers to fit new demands. Flame-proof, rot-proof and sun-proof cotton fabrics are available.

By HORACE LOFTIN

► HUMAN BEINGS are never satisfied with what they have.

Take cotton, for example. Cotton fibers and seeds, just as they come off the plant, can furnish man with everything from clothing and food to a myriad of industrial products that make his life easier. But that is not enough for man. He wants to alter the very nature of the fibers and seeds, to force them to serve him even better.

This is just what is happening in agricultural and industrial research centers across the country. The scientists that staff these laboratories are tailor-making cotton products to fit the wishes of the people.

The chief center of cotton investigation in this country is the U. S. Department of Agriculture's Southern Regional Research Laboratory in New Orleans. This laboratory's scientists have turned out new kinds of flame-resistant fibers: rot-proof and scorch-proof textiles, semi-elastic gauze bandages that wrap snugly around knees and elbows, and agricultural shade cloth that lasts for years in exposed weather.

They have developed a twine for nets that outlasts by far any other cotton materials against the ravages of salt water and marine bacteria.

Change Cotton's Properties

The Southern Laboratory's scientists not only alter the properties of cotton in their test tubes, but actually make new substances out of cotton which do jobs that cotton cannot do.

Such a substance is PA (for "partially acetylated") cotton. By reacting common cotton fibers with glacial acetic acid and acetic anhydride in the presence of catalyst, they are able to make this new "cotton-type" fiber, which is superior to cotton fiber in many ways.

The new PA cotton absorbs only about half as much moisture from the air as ordinary untreated cotton, the key to much of its usefulness. For instance, since it picks up little moisture, it is much better than cotton as electrical insulation. It swells less when wet, so it maintains its weight, length and width more uniformly under varying weather conditions.

The chemical structure of PA cotton makes it highly resistant to destructive bacteria and fungi. In rigorous tests in which samples of PA cotton and regular cotton were subjected to bacterial attack, the PA cotton retained 87% to 100% of its strength

after the untreated samples had practically deteriorated.

Rapid deterioration of nets in salt water has been a constant problem of fishermen. But in tests conducted on the North Carolina coast, nets made of PA cotton lasted two to three times longer than cotton twine nets coated with tar—the best cotton net before PA cotton came along. Untreated cotton net did not even show; PA cotton was eight to ten times as lasting.

Neat Cotton Bandage

Is there anything more frustrating than trying to put a neat gauze bandage about a knee, elbow or other awkward part of the body? That problem has also been solved by the cotton chemist. They have perfected a semi-elastic gauze that molds itself with a light, steady pressure to body contours; and as an extra bonus, outer layers of the wrapping cling to inner layers, preventing the bandage from unwinding.

This semi-elastic cotton gauze is prepared by soaking regular cotton yarn in a solution

of sodium hydroxide. This treatment causes the fibers to swell in diameter while they shrink in length, leaving the fibers soft, crinkly and stretchable. After this treatment, gauze can be easily stretched 20% of its normal length. A 10-inch piece of the gauze stretched to 12 inches is only 0.5 inch longer upon returning to normal tension.

The semi-elastic material has proved so successful that the U. S. Department of Defense has adopted it as a standard medical gauze for the armed forces.

Flame-Resistant Cottons

It is produced commercially by at least three manufacturers and is now available for civilian use.

Cotton fabrics that resist flames are another triumph of the laboratory. In the past, highly flammable cotton has been made somewhat fireproof by use of simple chemicals such as borax and boric acid mixtures. These, however, lose their effect after a single washing. But with new processes using chemicals whose unwieldy names have been reduced to the abbreviations THPC and BAP, flame resistance persists after many washings and without markedly altering the textile qualities of the cotton.

THPC is tetrakis (hydroxymethyl) phos-



OLD AND NEW COTTON—The flame licks helplessly at this flame-resistant cotton fabric, although the cotton boll beside it would quickly burn. Around the finger is the new semi-elastic gauze bandage that wraps neatly and stays in place. Beneath the match are other samples of rot-proof, sun-proof or semi-elastic cotton from the test tube.

phonium chloride, and BAP is bromoform-allyl-phosphate.

The THPC process forms a protective substance within the fibers, while BAP treatment leaves a protective coat about the fibers. Formerly, one or the other of the treatments were used separately. Recently, however, a process using both has been developed, giving even more effective flame resistance.

Cotton Netting for Shelter

Several agricultural products, such as certain germinating seeds and cigar-wrapper tobacco must be grown under shade. Cotton netting is used as a shelter. But the intense rays of the sun, plus the constant exposure to all kinds of weather, meant the netting had to be replaced each year at large cost to the farmers. The cotton chemists attacked this problem, too, and emerged with the answer.

Treatment of the cotton cloth with lead chromate, a yellow pigment, will cut the harmful effects of the sun on the cloth while allowing useful light to pass through to the plants.

Putting their laboratory find to practical test, they found that treated cotton cloth lasted for three seasons over Florida fields,

and retained 25% of its initial strength even then.

Nor are the scientists content to alter the fibers of cotton alone. They want to change the plant itself to make it more useful.

The common varieties of cotton have glands over most of the plant that produce a toxic substance, gossypol. This substance is harmful to many kinds of livestock, making fodder from cotton waste unusable without special heat treatment. Now, USDA plant scientists are attempting to breed new varieties of cotton without the gossypol glands.

Already they have discovered a few varieties with just a few glands, and from these they hope to create their new kinds of cotton plants.

With this formidable list of accomplishments behind them, cotton scientists are just beginning to fight for more and better changes. Like all humans, they are always dissatisfied; but unlike most, they are able to do something about it.

SCIENCE SERVICE has prepared a kit containing samples of P.A. cotton, flame-resistant cotton, semi-elastic gauze and treated cotton shade cloth. There are also samples of untreated cotton cloth included for comparison, as well as a cotton boll still containing the seeds. A booklet accompanying the kit

describes simple experiments that can be performed with the cotton samples to demonstrate their unique qualities.

These kits are available for the curious-minded at 75 cents each, or three for \$1.50, from SCIENCE SERVICE, 1719 N St., N.W., Washington 6, D. C. When making request, ask for the Modern Cotton Unit.

Science News Letter, November 12, 1955

PSYCHOLOGY

Very Fast Reading May Really Be Skimming

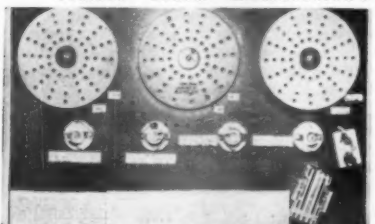
► THE FASTEST a person can read aloud is about 220 words per minute.

Rates much higher than 300 words per minute reported for silent reading are probably rates for skimming, not reading, Drs. J. R. Pierce and J. E. Karlin of Bell Telephone Laboratories, Murray Hill, N. J., told the National Academy of Sciences meeting in Pasadena.

The limitation that puts a ceiling on the speed with which people can read aloud is not mechanical, the scientist reported. This is shown by the fact that a person can repeat phrases or read prose considerably faster than he can read words on a list.

Science News Letter, November 12, 1955

Can you think faster than this Machine?



Control Panel of GENIAC set up to do a problem in check valve research.

Be careful before you answer. GENIAC the first electrical brain construction kit is equipped to play tic-tac-toe, cipher and encipher codes, convert from binary to decimal, reason in syllogisms, as well as add, subtract, multiply and divide. Specific problems in a variety of fields — actuarial, policy claim settlement, physics, etc., can be set up and solved with the components. Connections are solderless and are completely explained with templates in the manual. This covers 33 circuits and shows how new ones can be designed.

You will find building and using GENIAC a wonderful experience; one kit user wrote us: "this kit has opened up a new world of thinking to me." You actually see how computing, problem solving, and game play (Tic-tac-toe, nim, etc.) can be analyzed with Boolean Algebra and the algebraic solutions transformed directly into circuit diagrams. You create from over 400 specially designed and manufactured components a machine that solves problems faster than you can express them.

Schools and colleges, teachers of science or math, engineering, philosophy or psychology will find these excellent demonstrators of circuitry, solutions in symbolic logic, theory of numbers, cybernetics, and automation.

Note: Teachers take advantage of our 10% discount to educational institutions and for group purchases.

SEND for your GENIAC kit now. Only \$19.95 with over four hundred components and parts, fully illustrated manual and wiring diagrams. We guarantee that if you do not want to keep GENIAC after one week you can return it for full refund plus shipping costs.

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

AMERICAN IMPORTS: A Study Jointly Sponsored by the Twentieth Century Fund and the National Planning Association With a Policy Statement by the Association's Committee on International Policy—Don D. Humphrey—*Twentieth Century Fund*, 546 p., illus., \$6.00. Intended to contribute to a wider understanding of the economic analysis of imports. Report of a research study.

THE AMERICAN SPECIES OF AESCHYNOMENE—Velva E. Rudd—*Govt. Printing Office*, Contributions, United States National Herbarium, Volume 32, Part 1, 172 p., illus., paper, 75 cents. Some 350 species have been ascribed to this "sensitive plant" member of the legume family. Some of the plants are prostrate but they are not true vines.

BASIC MATHEMATICS: For Science and Engineering—Paul G. Andres, Hugh J. Miser and Haim Reingold—*Wiley*, 846 p., illus., \$6.75. Covering mathematics from algebra through introductory calculus. The slide rule is explained early and used throughout the book.

BIBLIOGRAPHY OF MONOLINGUAL SCIENTIFIC AND TECHNICAL GLOSSARIES: Volume 1, National Standards—Eugen Wuster—*UNESCO (Columbia University Press)*, 219 p., paper, \$2.50. Listing and classifying by branch of science 1,581 works.

BOLTZMANN'S DISTRIBUTION LAW—E. A. Guggenheim—*North-Holland Publishing Co.* and *Interscience*, 61 p., \$1.50. For first year university students of physics and chemistry who have had adequate training in calculus.

BRITISH CIVIL AVIATION: Aircraft and Operators—D. G. T. Harvey with foreword by Air Marshal Sir Hugh S. P. Walmsley—*Adlard Coles and Harrap (John de Graff)*, 168 p., illus., \$3.00. Illustrations and identifying details of

every machine flown by British airlines, together with information about the companies that operate them.

CANCER AND COMMON SENSE—George Crile, Jr.—*Viking*, 118 p., \$2.75. Cancer, the author points out, is not a single entity. There is no reason, he says, to bundle all cancers together and wrap them up, the harmless as well as the harmful, in a package of fear.

THE CONSUMER IS YOUR CUSTOMER—Jules Labarthe—*Mellon Institute*, 5 p., paper, free upon request direct to publisher, 4400 Fifth Ave., Pittsburgh 13, Pa. A review of consumer complaints and discussion of how to correct the flaws.

DRY WHOLE MILK: A Symposium Sponsored by the Quartermaster Food and Container Institute—J. M. McIntire, W. K. Stone and Martin S. Peterson, Eds.—*National Academy of Sciences-National Research Council*, 194 p., illus., paper, free upon request to Quartermaster Food and Container Institute, 1819 West Pershing Road, Chicago 9, Ill.

DRYING AND DEHYDRATION OF FOODS—Harry W. von Loesecke—*Reinhold*, 2d ed., 300 p., illus., \$7.50. An integrated survey of modern techniques for use by chemical engineers and food processors.

AN ELEMENTARY TEXTBOOK OF PSYCHOANALYSIS—Charles Brenner—*International University Press*, 219 p., \$4.00. An introduction to the field for professional people.

EXCAVATIONS AT NEW TESTAMENT JERICO AND KHIRBET EN-NITLA: Joint Expedition of the Pittsburgh-Xenia Theological Seminary and the American School of Oriental Research in Jerusalem—James L. Kelso, Dimitri C. Baramki and

others—*American Schools of Oriental Research*, 60 p., illus., \$6.00. Among the impressive finds was a civic center with a lay-out described as reminding one of a world's fair with spectacularly beautiful buildings.

THE FIRST BOOK OF PRINTING—Sam and Beryl Epstein—*Franklin Watts*, 62 p., illus., \$1.95. Explaining for children how printing is done and something of its history.

HOUSES ARE FOR PEOPLE: A Study of Home Buyer Motivation—Glenn H. Beyer, Thomas W. Mackesey and James E. Montgomery—*Cornell University Housing Research Center*, 58 p., illus., paper, \$1.75. Surveys showing what features of house plans are liked or disliked by those who will live in the house. More than 1,000 families were interviewed.

HYDROGEN PEROXIDE—Walter C. Schumb, Charles N. Satterfield and Ralph L. Wentworth—*Reinhold*, American Chemical Society Monograph Series, 759 p., illus., \$16.50. Prepared to fill the need for a critical and comprehensive source of information in the English language.

THE IMPORTANCE OF PHYSIOTHERAPY IN THE TREATMENT OF SICK CHILDREN—Joan M. Jewry-Harbert—*Staples (John de Graff)*, 84 p., illus., \$2.50. For the physiotherapist working with babies.

INTRODUCTION TO MODERN PHYSICS—F. K. Richtmyer, E. H. Kennard and T. Lauritsen—*McGraw-Hill*, 5th ed., 666 p., illus., \$8.50. For students who wish to survey the origin and development of modern physics, either as a preparation for more advanced courses or to serve as a bird's-eye view for those in academic or professional courses.

JOHNNY VISITS HIS DOCTOR—Josephine Abbott Sever—*Public Relations Department, Children's Medical Center*, 30 p., illus., paper, 50 cents. This little book is intended for parents to read to their child before he goes for that periodic check-up. It explains what the doctor will do and the purpose of the many strange objects he will see in the doctor's office.

LIFE AND DEATH OF THE SOIL: The Story of the Land and Its Importance to Man—Robert C. Sherman—*Science Research Associates*, 48 p., illus., paper, 60 cents. To inform high school students how poor farming techniques can create deserts and even destroy an entire community.

MODERN OSCILLOSCOPES AND THEIR USES—Jacob H. Ruiter, Jr.—*Rinehart*, rev. ed., 346 p., illus., \$6.50. Explaining the use of the oscilloscope through a learning-by-doing method.

NORTH AMERICAN BIRDS OF PREY—Alexander Sprunt, Jr. with foreword by Roger Tory Peterson—*Harper*, under sponsorship of the National Audubon Society, 227 p., illus., in color, \$5.00. The raptors, called by Peterson the finest of

Continued on p. 319

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Sulfur
Multi-Layer Wood
Fingerprint
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Kidskin
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Polaroid
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Questions

ASTRONOMY—On what material do new stars feed? p. 312.

□ □ □

BIOCHEMISTRY—Why has crystallization of the polio virus been difficult? p. 310.

□ □ □

GENERAL SCIENCE—What unit is proposed as the "roof"? p. 309.

□ □ □

GEOPHYSICS—What is the I.G.Y.? p. 310.

□ □ □

MANPOWER—How is the manpower shortage breaking racial bars? p. 313.

□ □ □

MEDICINE—Against what kind of colds will the new vaccine be tested? p. 307.

□ □ □

PSYCHOLOGY—How many dimensions are suggested for the mind? p. 311.

□ □ □

Photographs: Cover, V. B. Scheffer—U. S. Fish and Wildlife Service; p. 307, Clifford E. Matteson; p. 309, North American Aviation, Inc.; pp. 310 and 311 (right only), United Press Photo; p. 311 (left only), Columbia University; p. 314, Fremont Davis; p. 320, Austin Home Utilities, Inc.

Cattle productivity in the United States has increased 38% during the 30 years from 1924 to 1954.

A transistor radio set powered by transistor batteries could give more than 500 hours of listening time for 60 cents worth of batteries.

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BIOLOGY NATURE RAMBLINGS by Horace Laffin



Bison not Native

► LIKE THOSE other "native" Americans, the Indians, the thundering herds of bison first came into the New World as immigrants from Asia. In point of time, the bison are more "American" than the Indians, however, since the first herds probably crossed the old land bridge at the Bering Strait in middle Pleistocene times, some 400,000 years ago.

Man probably came over the land bridge from Asia to North America some time between 30,000 and 35,000 years ago.

The common bison of Pleistocene times was larger than our modern American animal. The head and horns were larger, and the cores of the horns were 40 or more inches from tip to tip. There were also several races of bison present in those early days.

There were long-horned bison which ranged from Alaska to Kansas. Some fossil skulls found in Alaska had a spread of horn core of more than five feet. In other proportions these skulls are only a little larger than the modern bison skull.

Another race whose remains were found in Texas had flat horns. The majority of the extinct races, however, had the typical short, round horn, and experts generally be-

lieve that the modern bison are descended from these. The ancient bison probably became diversified in their Old World home, migrating to America as well-defined races.

Even today there are remnants of once widespread bison herds in Europe. These European bison, or wisents, are restricted to a few zoos and protected areas in Europe and probably number less than a hundred at present.

Just recently the Washington National Zoo acquired a pair of these wisents, the first to be seen in America in 30 years.

The first modern Europeans to see an American bison were the soldiers of the Spanish conquistador, Cortez. They witnessed the beast in the menagerie of the Aztec ruler, Montezuma, in what is now Mexico City, calling it a great rarity. Only several years later did other Spanish explorers come across the great herds in what is now the United States.

Although there is only one true species of American bison, three types within the species are generally recognized. One of these, the mountain bison which inhabited the eastern slope of the Rockies, became extinct in the 1860's.

Another, the wood bison, survives in the Canadian wilds, while the plains bison, most famous and numerous of them all, is found on preserves in the U. S.

Science News Letter, November 12, 1955

TECHNOLOGY

Can View Radar in Bright Room

► RADAR can now be viewed like a movie, but without darkening the room, using a direct-viewing storage tube that has three electron guns developed by the Radio Corporation of America.

The first gun floods the screen to produce an extremely bright image. The second draws the radar image on the screen, while the third erases the image to ready the screen for the next picture.

The experimental system was announced at a meeting of the Institute of Radio Engineers in Washington by Harvey O. Hook of the David Sarnoff Research Center of RCA at Princeton, N. J.

Science News Letter, November 12, 1955

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Books of the Week

Continued from p. 316

all birds, are nevertheless subjected to a barrage comparable to that directed at the clay pigeons in a shooting gallery. Losses have been so high that now there may be fewer than 1,000 pairs of bald eagles left in the country where this bird is the national emblem.

PERFORMANCE OF THREE TYPES OF INDIRECT WATER HEATERS—Warren S. Harris and Lyman L. Hill—*University of Illinois Bulletin*, Engineering Experiment Station Bulletin No. 432, 46 p., illus., paper, 75 cents. A study to determine which type of water heater is most economical in summer and in winter, and which provides the best supply of hot water.

REACTOR HANDBOOK: Materials, General Properties—United States Atomic Energy Commission—*McGraw-Hill*, 610 p., illus., \$10.50. For reference use by scientists and engineers engaged on AEC reactor projects, this handbook of nuclear engineering data was compiled.

THE REMOVAL OF ENTAMOEBA HISTOLYTICA CYSTS FROM WATER BY POROUS FILTER SEPTUMS EITHER WITH OR WITHOUT FILTER AID—E. Robert Baumann and Harold E. Babbitt—*University of Illinois Bulletin*, Engineering Experiment Station Bulletin No. 431, 40 p., illus., paper, 60 cents. A study to determine what must be done to make drinking water safe.

A REVIEW OF THE NAMATODE GENUS TYLENCHORHYNCHUS—M. W. Allen—*University of California Press*, 37 p., illus., paper, 50 cents. Describing many new species and reviewing the whole genus.

SECRETS OF TAKING GOOD PICTURES—A. A. Knopf—*Hanover House*, 144 p., illus., \$2.00. Advice to the beginner on selection of a camera and film, and on the lighting and posing of simple snapshots.

SERVICES FOR HANDICAPPED CHILDREN: A Guide to General Principles and Practices for Public Health Personnel—Committee on Child Health—*American Public Health Association*, 148 p., \$1.50 or \$5.10 for set of four. One of four guides to methods of community care for handicapped children.

SERVICES FOR CHILDREN WITH CEREBRAL PALSY: A Guide for Public Health Personnel—American Academy for Cerebral Palsy and Committee on Child Health—*American Public Health Association*, 107 p., paper, \$1.50 or \$5.10 for set of four.

SERVICES FOR CHILDREN WITH CLEFT LIP AND CLEFT PALATE: A Guide for Public Health Personnel—Committee on Child Health—*American Public Health Association*, 83 p., paper, \$1.50 or \$5.10 for set of four.

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SERVICES FOR CHILDREN WITH DENTOFACIAL HANDICAPS: A Guide for Public Health Personnel—Committee on Child Health—*American Public Health Association*, 67 p., paper, \$1.50 or \$5.10 for set of four.

SPECIAL EDUCATION FOR THE EXCEPTIONAL: Volume I, Introduction and Problems—Merle E. Frampton and Elena D. Gall, Eds.—*Porter Sargent*, 453 p., illus., \$5.50. In the United States, there is only one "special teacher" for an average of 180 children with exceptional needs.

SPECIAL EDUCATION FOR THE EXCEPTIONAL: Volume II, The Physically Handicapped and Special Health Problems—Merle E. Frampton and Elena D. Gall, Eds.—*Porter Sargent*, 677 p., illus., \$5.50. What our nation's schools are doing for the blind, deaf, crippled, and those with cardiac or other disability.

STATISTICAL SUMMARY OF EDUCATION 1951-52—Rose Marie Smith—*Govt. Printing Office*, Office of Education, Biennial Survey of Education in the United States, 1950-52, Chapter 1, 65 p., paper, 30 cents. Condensed data from about 165,000 educational institutions.

TAKE 100,000 VOLTS: How To Build Small Inexpensive Tesla Equipment of the Spark Oscillator Type and How To Live With Electricity—Bob Brown and Betty McCall—*Vow Laboratories*, 19 p., illus., paper, \$1.00. Science Club members and other amateurs will have fun making this inexpensive Tesla coil, and anyone using house current will be interested in the second article prepared with cooperation from the National Safety Council.

THE TIME BOOK OF SCIENCE—Jonathan Norton Leonard—*Random House*, 356 p., illus., \$3.95. The science editor of *Time* magazine gathers together some of the interesting things he has written about.

TRANSISTORS AND OTHER CRYSTAL VALVES—T. R. Scott—*Macdonald & Evans (Essential Books)*, 258 p., illus., \$7.20. Intended to give engineers who may need to use transistors in the future a reasonably clear picture of the stage of their present development. By an English author.

TREATISE ON INVERTEBRATE PALEONTOLOGY: Part V, Graptolithina with sections on Enteropneusta and Pterobranchia—*Geological Society of America and University of Kansas Press*, 101 p., illus., \$3.00. This treatise presents a comprehensive, compact and authoritative statement of the knowledge concerning invertebrate fossil groups.

THE WASHO ROAD TEST: Part 2, Test Data, Analyses, and Findings—Fred Burggraf, Elmer M. Ward, and Walter J. Miller, Eds.—*Highway Research Board*, Special Report 22, 212 p., illus., paper, \$3.60. Standard asphalt roads can carry the heaviest legal truck loads, but paved shoulders greatly improve the performance.

Science News Letter, November 12, 1955

A blind boy's story of how he learned mathematics through college without Braille, a clear authentic, semi-popular introduction to topology and "A Development of Associative Algebra and Algebraic Number Theory" are among the varied articles that will appear in the current volume of the *Mathematics Magazine*. This magazine contains features of interest to any intelligent reader.

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ASTRONOMY

Collision of Galaxies Takes A Million Years

► A MILLION-YEAR COLLISION in the heavens is being watched by astronomers, Dr. R. Minkowski of Mt. Wilson and Palomar Observatories has reported.

He told the National Academy of Sciences meeting in Pasadena, Calif., that recent observations suggest the gigantic galactic collision "is now in progress in the northern part of the system."

In the system's southern part, the interaction is finished, but has left the now-combined gas of the two galaxies in a "highly excited, heated and turbulent state," Dr. Minkowski said.

Spectroscopic observations on which Dr. Minkowski's conclusions concerning NGC-1275 are based were made by Dr. Walter Baade, also of Mt. Wilson and Palomar Observatories.

The late type galaxy is moving toward the early type one at a velocity of about 1,800 miles per second, Dr. Minkowski reported. The equatorial planes of the two systems seem to form an angle of about 20 degrees.

Science News Letter, November 12, 1955

Ground moles are attracted to lawns and turf in which grubs abound.

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❁ **FRYING DISC** is a shallow well frying pan that drains foods fried in deep fat. The heat and drain ledge of the pan drains the food at a maintained heat of more than 250 degrees Fahrenheit. The pan is also spatter-proof.

Science News Letter, November 12, 1955

❁ **PLASTIC DOILIES** are made of flexible white polyethylene in a lacelike design. Easily wiped or washed clean, they are described as lasting indefinitely. They are available in four-, six- or eight-inch sizes.

Science News Letter, November 12, 1955

❁ **JUNIOR-SIZED LATHE** designed for young hobbyists is both an educational toy and useful producer of items made from wood, plastic and aluminum. Only 27 inches long, the lathe has a built-in 1/35 h.p. electric motor and weighs 16 pounds.

Science News Letter, November 12, 1955

❁ **HOMEMADE CLOCK** comes in a do-it-yourself kit complete with all parts except the covering for the face. Designed for the housewife so that she can match her other home decorations, the face of the clock is covered with any fabric the homemaker desires to use. Dot numerals and hands are made from brass. Brush and adhesives are included in the kit.

Science News Letter, November 12, 1955



❁ **PORTABLE DESK and Chair** for youngsters is made of clear redwood finished in a non-toxic stain. The multi-duty furniture unit for children can be unfolded and used as a chair, desk, playtable, dining table or bench. The desk stands 22 1/4 inches high and the seat has a storage shelf underneath it, as shown in the photograph.

Science News Letter, November 12, 1955

❁ **ELECTRONIC FLASH UNIT** from Germany is usable with all cameras now synchronized for electronic flash. The unit operates on either three flashlight cells, 110 or 220 AC current or a wet-pack battery. The compact plastic case measures seven and three quarters by five and three-quarters by three inches.

Science News Letter, November 12, 1955

❁ **UNBREAKABLE GLASSWARE** is described as two to three times stronger than its nearest competitor. Bacteria-proof and having an unusual stainproof quality, the glassware is the development of a British glassmaking firm.

Science News Letter, November 12, 1955

❁ **AUTOMATIC WINDING WATCH** billed as the world's smallest self-winding watch for ladies is smaller than a dime. The winding mechanism consists of three major parts only, making it simpler for servicing. Equipped with an unbreakable mainspring, the watch has 17 jewels.

Science News Letter, November 12, 1955

Do You Know

Present-day, faster-growing broiler chickens need more growth-promoting vitamins than chickens of the past.

One species of frogs builds a craterlike structure of mud projecting above shallow water within which its eggs are laid in the dry season.

Glass is believed to have been invented in ancient Egypt.

Pine heartwood in large trees may be salvaged five or 10 years after being killed by fire.

The XF8U-1, a new Navy jet fighter, is equipped with a ram-air emergency power package designed to bring the plane home if all other power supplies should fail.

Nuclear magnetic resonance promises to provide the chemist with a powerful new analytical tool that will aid him both in molecular research and in routine analysis.

One mustard weed uses four times the water and potash needed by a well-developed oat plant.

Some 100,000,000 acres of land in the United States have never been surveyed, due principally to inaccessibility.

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